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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

BERNATZ, KEVIN M

ART UNIT	PAPER NUMBER
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1773

DATE MAILED: 09/30/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/022,728

Applicant(s)

CHEN ET AL.

Examiner

Kevin M Bernatz

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-19 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1 and 3-19 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6. 6) ☐ Other: .

DETAILED ACTION

Response to Amendment

1. Amendments to claims 1, 2, 11 and 20, filed on June 30, 2003, have been entered in the above-identified application.
2. The Examiner notes that page 2 of the amendment filed on June 30, 2003 makes reference to replacement pages for the specification. However, the amendments to the specification pages 4, 5 and 20, have *not* been entered in the above-identified application since the amendment failed to include replacement pages to be entered, nor pages showing the changes desired. As such, the Examiner is uncertain if the amendment request is a typographical error or if the submitted amendment is missing pages. A telephone message was left for Mr. Raj Davé on September 15, 2003 to request a FAXed copy of any amendments to the specification, but none have been received at the time of mailing of this action.
3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 103

4. Claims 1, 3, 6 and 9 – 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bian et al. ('742 A1) in view of Lal et al. ('924), Okumura et al. ('733) and applicants' admissions and evidenced by Wang et al. (U.S. Patent App. No. 2002/0063108 A1).

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Regarding claims 1 and 11, Bian et al. disclose a magnetic recording medium comprising: a non-magnetic substrate (*Figure 2 – element 10 and Paragraph 0021*), a B2-structured ruthenium-aluminum (RuAl) containing underlayer (*element 14; Paragraph 0023; and claims 1 and 13*) comprising a (200) crystallographic orientation (*Paragraphs 0031 and 0032; and claim 14*); and a magnetic layer (*element 20*) comprising a Co (11.0) crystallographic orientation (*Paragraph 0031*).

Bian et al. fail to disclose the non-magnetic substrate being textured, nor an OR-Mrt of more than about 1.05.

However, Okumura et al. teach that “examples having mechanical texture show increased anisotropy and improved coercive force” (*col. 6, lines 56 – 60*), wherein the “anisotropy” referred to by Okumura et al. is the orientation ratio (OR) measured by the coercivity, OR-Hc (orientation ratio of Hc(circumferential) to Hc(radial) – see Table 1). Both Lal et al. and applicants’ provide further evidence that it is known in the art that for longitudinal recording, an increased orientation ratio (i.e. ~ 1.50 or higher), including orientation as measured using Mrt (*applicants’ specification, page 6, lines 3 – 16*), results in improved S/N and an improved longitudinal medium (*Lal et al.: Figure 3; Table 1; and col. 7, lines 36 – 44; applicants’ specification: page 6, lines 3 – 16*). Furthermore, Wang et al. provides evidence that the orientation ratio is a measure of the relative orientation of the magnetic grains and their properties in the circumferential to radial directions (*Paragraphs 0003, 0007, 0022, and 0036*) and that the orientation ratio can be measured by comparing the relative magnitude of any of the magnetic properties, such as Hc, Mrt or squareness (*Tables 3.1 – 3.3*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Bian et al. to mechanically texture the substrate as taught by Okumura et al. in order to increase the Mrt orientation ratio to above 1.05, which results in an improved longitudinal recording medium having increased coercive force and improved S/N.

Regarding claim 3 and 12, Bian et al. disclose RuAl alloys meeting applicants' claimed limitations (*Table 1*).

Regarding claims 6 and 13, Bian et al. disclose a chromium-containing second underlayer (*Figure 2 – element 16 and Paragraph 0023*) disposed between the RuAl underlayer and the magnetic layer.

Regarding claims 9 and 15, Bian et al. disclose magnetic layers meeting applicants' claimed limitations (*Paragraph 0023 and 0057*).

Regarding claims 10 and 16, Bian et al. disclose thickness values meeting applicants' claimed limitations (*claim 12*).

Regarding claim 14, Bian et al. disclose a CoCr layer meeting applicants' claimed limitations (*Figure 2 – element 18; and Paragraphs 0042 and 0045*).

5. Claims 4, 7, 8, 17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bian et al. ('742 A1) in view of Lal et al. ('924), Okumura et al. ('733) and applicants' admissions as applied above, and further in view of either Chen et al. ('795) or Chen et al. ('923). The Examiner notes that both Chen et al. references disclose identical subject matter (US '795 is the U.S. equivalent of WO '923) and the

Examiner will only cite relevant sections from US '795 in the following rejection. Wang et al. ('108 A1) is supplied as an evidentiary reference in the above rejection

Bian et al. in view of Lal et al., Okumura et al. and applicants' admissions is relied upon as described above.

Regarding claims 4 and 17, none of the above disclose a sputter-deposited oxidized NiP film on a non-metallic substrate.

However, Chen et al. ('795) teach that sputter depositing an oxidized NiP film on a non-metallic substrate results in a B2 underlayer exhibiting improved (200) orientation and a (1120)-oriented magnetic layer possessing high coercivity and suitable for high density longitudinal recording (*col. 3, lines 18 – 20 and 60 – 64; col. 5, lines 3 – 11 and 28 - 37; col. 9, lines 45 – 49; col. 10, lines 1 – 25; and claim 1*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Bian et al. to include a sputter deposited oxidized NiP layer on a non-metallic substrate as taught by Chen et al. ('795) in order to improve the (200) orientation in the B2 RuAl layer, resulting in an improved (1120)-oriented magnetic layer possessing high coercivity and suitable for high density longitudinal recording.

Regarding claims 7 and 19, Chen et al. ('795) disclose phosphorus contents meeting applicants' claimed limitations (*Table 4*). The exact phosphorous content is a cause effective variable in terms of the crystallization temperature of the NiP. It would, therefore, have been obvious to one having ordinary skill in the art to have determined the optimum value of a cause effective variable such as the phosphorous content

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through routine experimentation. *In re Boesch*, 205 USPQ 215 (CCPA 1980), *In re Woodruff*, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Chen et al. ('795) further disclose surface oxidizing the NiP layer in a variety of conditions (*col. 5, lines 28 – 47 – and disclosure of 08/586,529, incorporated by reference and cited below*). The examiner deems that the oxygen content in the top 50 Å (i.e. a “surface oxidation”) is a cause effective variable based on the time and temperature of oxidation, and affects the roughness and crystal growth of the subsequent layers. It would, therefore, have been obvious to one having ordinary skill in the art to have determined the optimum value of a cause effective variable such as the surface oxygen content through routine experimentation.

Regarding claim 8, Chen et al. ('895) disclose oxidized NiP layers meeting applicants' claimed thickness limitations (*col. 5, lines 50 - 52*).

6. Claims 5 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bian et al. ('742 A1) in view of Lal et al. ('924), Okumura et al. ('733), applicants' admissions and either Chen et al. ('795) or Chen et al. (WO '923) as applied above, and further in view of Abarra et al. ('949 A1). Wang et al. ('108 A1) is supplied as an evidentiary reference in the above rejection.

Bian et al. in view of Lal et al., Okumura et al., applicants' admissions and either Chen et al. reference is relied upon as described above.

Regarding claims 5 and 18, none of the above references disclose using an Al-alloy substrate, though Chen et al. ('795) does state that the “substrates employed in

the present invention can advantageously comprise any of the various substrates conventionally employed in the manufacture of magnetic recording media” (*col. 10, lines 18 – 21*).

However, Abarra et al. teach using an Al or glass substrate under an oxidized NiP layer (*Paragraphs 0037 – 0038*), thereby teaching the equivalents of Al-alloy non-magnetic substrates and glass non-magnetic substrates. See also supporting evidence supplied by Wang et al. (*Paragraph 0015*).

Substitution of equivalents requires no express motivation as long as the prior art recognizes the equivalency. In the instant case, Al-alloy substrates and glass/glass-ceramic substrates are equivalents in the field of substrates for magnetic recording media, as taught by Abarra et al. and Wang et al. above. *In re Fount* 213 USPQ 532 (CCPA 1982); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *Graver Tank & Mfg. Co. Inc. v. Linde Air Products Co.* 85 USPQ 328 (USSC 1950).

Regarding claim 5, the limitation “electrolessly plated” is a product-by-process limitation and is not further limiting in so far as the structure of the product is concerned. “[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. ***The patentability of a product does not depend on its method of production.*** If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.” [emphasis added] *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). See MPEP § 2113. Once a product appearing substantially identical is found,

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the burden shifts to applicant to show an ***unobvious*** difference between the claimed product and the prior art product. *In re Marosi*, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983). In the instant case, whether the NiP is sputter deposited or electrolessly plated still results in a NiP film on the substrate which can be subsequently oxidized and/or textured.

Regarding claim 18, Abarra et al. further teach that the NiP layer can be both oxidized and textured, wherein the oxidation results in improved (200) orientation of subsequently deposited layers and the texturing improves the medium orientation ratio and reduces head stiction (*Paragraph 0038*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Bian et al. in view of Lal et al., Okumura et al., applicants' admissions and either Chen et al. reference to both oxidize and texture the NiP layer as taught by Abarra et al. in order to both improve the (200) orientation of subsequently deposited layers and improve the medium orientation ratio while reducing the head stiction.

Regarding the limitations of electroless plating the substrate with the NiP layer and whether the texturing is "mechanical texturing", Okumura et al. teach that sputtering and electroless plating of NiP are art recognized equivalent methods of deposition (*col. 1, lines 60 – 62*). Okumura et al. also teach that "mechanical texturing" is an art recognized method of forming circumferential texturing to improve the OR ratio and increase the running durability of the medium (*col. 1, lines 16 – 29 and 64 – 67; Table 1; and col. 6, lines 56 – 60*).

Substitution of equivalents requires no express motivation as long as the prior art recognizes the equivalency. In the instant case, sputtering and electroless plating are equivalents in the field of deposition methods for NiP, as taught by Okumura et al. above. In addition, mechanical texturing and non-mechanical texturing are equivalents in the field of forming circumferential texture on a NiP layer for improved orientation ratio and head stiction/running durability.

Response to Arguments

7. The rejection of claims 1 - 20 under 35 U.S.C § 102(e) or 103(a) – Bian et al., either alone or in combination with various references

Applicants' arguments have been considered but are moot in view of the new grounds of rejection. In so far as they apply to the present rejection of record, applicant(s) argue(s) that "the Examiner seems to have recognized, but has not explicitly stated, that Bian discloses an isotropic media, *not* an oriented media". The examiner respectfully disagrees.

The Examiner notes that the reason the Examiner has not explicitly stated the above is because Bian et al. is not directed to an isotropic media, but an oriented in-plane/longitudinal media (*Paragraph 0011- "in-plane crystallographic orientation", Paragraph 0031- "a significant improvement of the C-axis in-plane orientation", Paragraph 0033 - "indicates a high degree of in-plane texture", and Paragraph 0037 - "The role of the RuAl layer of the preferred embodiment of invention is to ultimately control the orientation grain size and grains size distribution of magnetic grains"*). The

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Examiner notes that the relied upon teachings regarding the desired OR ratios all apply to in-plane/longitudinal media, i.e. analogous media to the Bian et al. invention.

In addition, applicants argue that there is no correlation between the OR-Hc and the OR-Mrt. The Examiner respectfully disagrees.

The Examiner has positively cited evidentiary art as asked for by applicants' to provide evidence that the Orientation Ratio (OR) can be measured by comparing the radial and circumferential dependence of almost any magnetic property, and that the ratio of the property values is a measure of the relative orientation of the magnetic grains. The OR is what is taught as important, regardless of the measurement technique used to report it. However, the Examiner notes that applicants' have specifically admitted that an OR-Mrt of 1.5 or higher is desired for oriented longitudinal recording media.

Finally, applicants argue unexpected results that a RuAl layer can produce an oriented media. The Examiner acknowledges applicants' allegation of unexpected results, but does not find them convincing.

Specifically, the Examiner notes that the prior art of record clearly teaches that RuAl leads to improved orientation (*Bian et al. citations above*) and that texturing of a substrate/coating layer can be used to produce improved OR values in longitudinal media (*Wang et al., Lal et al., Okumura et al. and applicants' admissions*). As such, the Examiner deems that one of ordinary skill in the art would have expected an Mrt OR greater than 1.05 given the texturing of the substrate/coating layer, regardless of the

subsequently deposited layers since the crystals of the underlayers *must* grow along the textured surfaces.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Marinero et al. (U.S. Patent No. 5,989,674) teach that it is known for longitudinal recording media to have an $OR > 1$, wherein the OR can be either measured by the coercivity, H_c , or the Mrt ratio (*col. 1, lines 62 – 63; col. 2, lines 10 – 29; and col. 7, lines 42 – 58*).

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Applicants' amendment resulted in embodiments not previously considered (i.e. the addition of the limitation "wherein the non-magnetic substrate is mechanically textured and OR-Mrt of the magnetic recording medium is more than about 1.05, thereby the magnetic recording medium is an oriented medium" to claims 1 and 11) which necessitated the new grounds of rejection, and hence the finality of this action.


10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M Bernatz whose telephone number is (703) 308-1737. The examiner can normally be reached on M-F, 9:00 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Thibodeau can be reached on (703) 308-2367. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0651.



KMB
September 20, 2003



Paul Thibodeau
Supervisory Patent Examiner
Technology Center 1700